THURSDAY, SEPTEMBER 12, 1918.

INDUSTRIAL CHEMISTRY.

I.

(1) *The Manufacture of Intermediate Products for Dyes.* By Dr. J. C. Cain. Pp. xi + 263. (London: Macmillan and Co., Ltd., 1918.) Price 10*s.* net.

(2) *The Alkali Industry.* By J. R. Partington. Pp. xvi + 304. ("Industrial Chemistry.") (London: Baillière, Tindall, and Cox, 1918.) Price 7*s.* 6*d.* net.

(3) *Edible Oils and Fats.* By C. A. Mitchell. Pp. xii + 159. ("Monographs on Industrial Chemistry.") (London: Longmans, Green, and Co., 1918.) Price 6*s.* 6*d.* net.

CHEMICAL industry in this country is slowly, but let us hope surely, coming into its own. Public interest has been directed to it, and its importance to the nation has been recognised, though there is still much leeway to make up in this respect. The industry also is finding itself from within; combination and association are taking the place of antagonism and aloofness, and before long the industry will speak with one voice to the public and to the Government on matters which concern it. One of the minor indications of progress is the increase both in the quantity and quality of our chemical publications, the enlarged Journal of the Society of Chemical Industry being a particularly valuable asset to the industry. The movement to produce text-books of industrial chemistry in English is of prime importance for the future of the industry; in the past we have been far too prone to resort to German works or their translations. Indeed, had it not been for the fortunate completion of Thorpe's "Dictionary of Chemistry" just before the war, English chemical workers ignorant of German would have been considerably handicapped.

An industrial text-book may be judged from several standards, depending on whether it aims at giving a complete account of modern practice in the particular industry or limits its scope to describing chemical theories and their applications to that industry. It may seek to be a work of reference to all engaged in the industry, or merely an introduction to beginners, or it may aim at stimulating progress by outlining the applicability of the most modern discoveries. The first type of book can be produced only by a writer who has had intimate experience in the industry and is free to put his information on record for the use of others. Normally, the majority of those possessing such knowledge are either pledged not to disclose it, or professionally engaged as consultants. The second type of book is more usual, and is naturally much more complete on the theoretical than on the practical side; it must be held to be successful if it encourages a greater knowledge of chemical science and scientific method and leads to progress in the industry.

(1) Dr. Cain is one of the few who are qualified to speak with authority on both the technical and chemical sides of the production of coal-tar colours, and not only is his book on the intermediate products certain to become the standard work on the subject, but also, what is more important, it should save an immense amount of time and money to those actually engaged in the industry. It has been pointed out at more than one shareholders' meeting lately that the intermediates are even more important than the dyes themselves, and that the provision of adequate plant for their manufacture is the first step in the establishment of a British dye industry. The intermediate products are so numerous, and so much depends on their cheap production, that it is quite irrational for each competing firm to manufacture its own requirements, and it is for this reason more than any other that it is desirable to establish a combine of the colour-making firms so as to manufacture intermediates in quantity, and therefore cheaply, at one or more specially equipped large works, and convert these to the finished dyestuffs at the existing smaller establishments.

Dr. Cain aims at providing in a convenient form detailed information as to the preparation of intermediates, the most trustworthy method of manufacture of each substance being recorded. Both the pure chemistry of the subject and chemical engineering details have been omitted. The chief chemical reactions employed—viz. nitration, nitrosation, halogenation, sulphonation, reduction, oxidation, fusion with alkali, hydrolysis, amidation, alkylation, acylation, condensation—are dealt with in the order enumerated.

This is not the place for any criticism in detail, which in any case must be a matter of personal opinion, and Dr. Cain's name is sufficient guarantee that no pains have been spared to render the work complete in every detail. Progress in this, as, indeed, in most branches of industry, has been gradual; perhaps at the moment the most marked trend is in the direction of the increased use of catalytic agents; there is also a great future for electrical energy, particularly in connection with oxidation and reduction. Oxidation in particular is to-day brought about by cumbersome and costly methods in comparison with what may be expected when it is possible to make use of atmospheric oxygen in conjunction with a catalyst.

(2) Mr. Partington's book, though entitled "The Alkali Industry," really deals with acids, alkalis, chlorine, and potassium salts, and practically half of it is devoted to nitric acid and ammonia, particularly the modern methods of their manufacture, which are being so much discussed at the present time. It forms one of a series of volumes, edited by Dr. Rideal, designed to show how chemical principles have been applied and have affected manufacture. The treatment is certainly novel, and it appears to the present re-

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viewer to be successful in that it provides a book which is far more readable than the ordinary text-books on the subject. Naturally, the author cannot hope to be in practical touch with so wide a field, and in his efforts to secure the necessary condensation somewhat unequal treatment has resulted; indeed, the first half of the book is far too condensed. In consequence, there are numerous points of detail which might be criticised adversely, and to this extent it fails to give an accurate picture of the industry. But such criticism is of minor importance as compared with the potential power of the work to stimulate interest, and it should certainly be placed in the hands of every process manager and chemist and of all students who wish to enter chemical industry. They cannot fail to read it and feel that there is still progress to be made in their processes, and that the chemical theory even of such well-worn manufactures as acid and alkali making has made great developments since the application of physical chemistry was understood.

So much interest attaches to-day to nitric acid, the importance of which in time of war and, it is to be hoped also, in time of peace to the nation is at last being understood, that the author may be forgiven for expanding on this subject. Quite apart from the future exhaustion of the deposits of Chile nitrate, once so eloquently pictured by Sir William Crookes, the invention of the submarine has introduced new problems into the transport of this material in time of war. The problem of the fixation of atmospheric nitrogen has been solved in Germany, and its solution here is, of course, only a matter of time. The problem was one demanding huge expenditure and prolonged experiment, and not commercially attractive to business undertakings hampered by unintelligent taxation; it is essentially national in character, and must be undertaken with State assistance, as it is by no means certain that under peace conditions the synthetic product can compete with the natural.

On account of the difficulties attending transport, acids are necessarily made close to the place where they are used, and consequently there are a large number of small manufacturers, many of whom are working on too small a scale to be economically efficient. The placing of this industry upon an economic basis is one of the many post-war problems which are already receiving attention. The alternative processes for the synthetic production of ammonia and nitric acid are discussed at length by Mr. Partington.

(3) Mr. Mitchell's book is of a somewhat different type from that of those already considered. It belongs to Sir Edward Thorpe's series of industrial monographs, which aim in particular at showing how fundamental and essential is the relation of principle to practice. Mr. Mitchell's object is to give a concise outline of the chemical composition and properties of the more important oils and fats. In this he has been successful, and the analytical sections will be found very useful, in spite of the fact that there are several satisfactory works on this section of the subject already in existence. It is more difficult, however, to justify the application of the title "industrial." A description is given of the methods of pressing and extracting oils from the crude materials, and of purifying and preparing them for food purposes; but this is very brief, and no attempt is made to discuss the many chemical problems which arise in the oil and fat industry. An altogether inadequate picture is given of the present state of the utilisation of science in the manufacture of edible oils.

The very full bibliography is one of the best features of the book; it is conveniently divided into sections. E. F. ARMSTRONG.

(*To be continued.*)

THE "KEW BULLETIN."

Royal Botanic Gardens, Kew. Bulletin of Miscellaneous Information, 1917. Pp. iv+349+36. (London: H.M.S.O., 1917.) Price 4*s*. 6*d*. net.

THE present volume of the *Kew Bulletin* is an effective rebuke to those in authority who for a time were able to deprive the leading botanical station of the Empire of its means of publication. It would seem an axiom of common sense that a scientific institution carrying out work of prime economic importance should be able to put on record and render as widely available as possible the results of its work.

The subject-matter of the volume was published in seven parts during the past year, and comprises thirty-seven articles of varied interest. The most important is a List of Economic Plants, native or suitable for cultivation in the British Empire, which formed a double number issued last December. This list was prepared in response to a suggestion from the Committee of the Botanical Section of the British Association that a more extended and thorough study of our economic plants was a matter of national and imperial importance. The plants are classified under their uses—such as oils, gums, rubber, drugs, timber, etc.; the source is indicated, and some useful information on the product is also given, with references to publications where fuller information may be obtained.

Other articles of economic importance deal with the rubber plant, *Hevea brasiliensis*; in two are discussed the possible methods of increasing the percentage yield of rubber by seed-selection, as was done in the cultivation of cinchona, in which the percentage yield of quinine has been more than doubled. Another deals with one of the most serious diseases to which this rubber-tree is subject—bark-canker, caused by a fungus, *Phytophthora Faberi*; the writer, Mr. A. Sharples, Government mycologist in the Federated Malay States, finds that the present position is most unsatisfactory, and that the subject calls for careful and co-ordinated investigation.

A general systematic review of the species of the genus Strychnos, native in India and the East,

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